

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 December 2003 (24.12.2003)

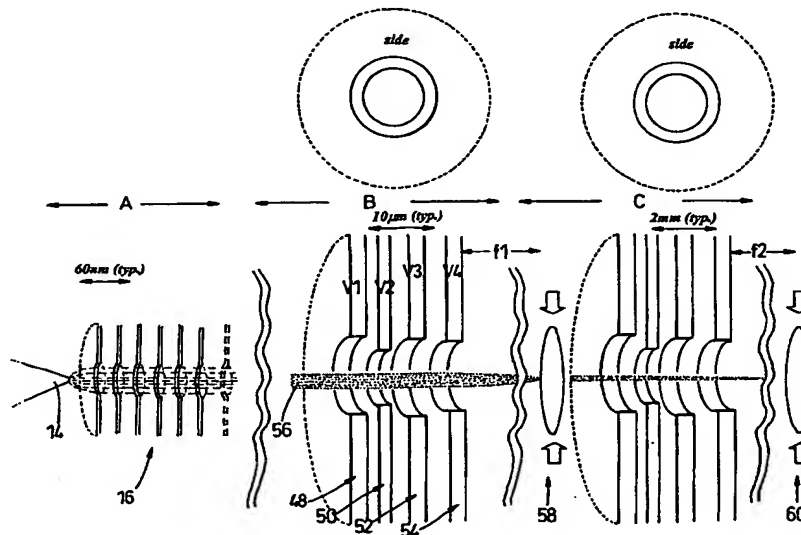
PCT

(10) International Publication Number
WO 2003/107375 A3

- (51) International Patent Classification⁷: **H01J 37/26, 37/317**
- (21) International Application Number: **PCT/GB2003/002560**
- (22) International Filing Date: **16 June 2003 (16.06.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
0213772.7 15 June 2002 (15.06.2002) GB
0219818.2 24 August 2002 (24.08.2002) GB
0300265.6 7 January 2003 (07.01.2003) GB
0302591.3 5 February 2003 (05.02.2003) GB
0303402.2 14 February 2003 (14.02.2003) GB
- (71) Applicant and
(72) Inventor: **EASTHAM, Derek, Anthony [GB/GB]; 58 Vincent Drive, Chester, Cheshire CH4 7RL (GB).**
- (74) Agents: **HAMMERSLEY, John et al.; Harrison Goddard Foote, Orlando House, 11c Compstall Road, Marple Bridge, Stockport SK6 5HH (GB).**
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— *of inventorship (Rule 4.17(iv)) for US only*
- Published:**
— *with international search report*
- (88) Date of publication of the international search report:
4 March 2004

[Continued on next page]

(54) Title: **CHARGED PARTICLE BEAM GENERATOR**



(57) Abstract: The source of electrons is a nanotip in a vacuum as used in near field microscopy. The source of ions is a similar nanotip in vacuum supplied with liquid metal (gallium) as in a liquid-metal ion source. Electrons or ions from this nanometre-sized tip are extracted by centralising the tip over an aperture plate and applying a suitable voltage to the tip. The electrons (ions) pass through this plate and are accelerated up to several keV using a nanoscale/microscale accelerating column before being focussed using further microscale (or nanoscale) cylindrical lenses. The final element is an aberration corrected miniature (or sub-miniature) einzel lens which can focus the beam at several millimetres from the end of the instrument.

WO 2003/107375 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 03/02560

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01J37/26 H01J37/317

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 023 060 A (KIM HO-SEOB ET AL) 8 February 2000 (2000-02-08) abstract column 1, line 57-62 column 2, line 18-24 figure 3	1,16,17
A	US 6 369 385 B1 (KIM HO-SEOB ET AL) 9 April 2002 (2002-04-09) abstract column 7, line 26-39 figures 5,8	1-17

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

24 November 2003

Date of mailing of the international search report

02/12/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

WINKELMAN, A -

Best Available Copy

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 03/02560

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>"FABRICATION OF VERTICALLY ALIGNED APERTURES FOR E-BEAM MICROCOLUMN APPLICATION"</p> <p>IBM TECHNICAL DISCLOSURE BULLETIN, IBM CORP. NEW YORK, US, vol. 37, no. 12, 1 December 1994 (1994-12-01), pages 583-584, XP000487902</p> <p>ISSN: 0018-8689</p> <p>page 583 -page 584</p>	1-17
A	<p>CHANG T H P ET AL: "A SCANNING TUNNELING MICROSCOPE BASED MICROCOLUMN SYSTEM"</p> <p>JAPANESE JOURNAL OF APPLIED PHYSICS, PUBLICATION OFFICE JAPANESE JOURNAL OF APPLIED PHYSICS. TOKYO, JP, vol. 31, no. 12B, PART 1, 1 December 1992 (1992-12-01), pages 4232-4240, XP000415428</p> <p>ISSN: 0021-4922</p> <p>abstract</p> <p>paragraph 'INTRO!</p> <p>table III</p> <p>figure 10</p>	1-17

Best Available Copy

INTERNATIONAL SEARCH REPORT

Initiation on patent family members

International Application No

PCT/GB 03/02560

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6023060	A	08-02-2000	EP 0980584 A1	23-02-2000
			JP 2000514238 T	24-10-2000
			TW 420821 B	01-02-2001
			WO 9945565 A1	10-09-1999
US 6369385	B1	09-04-2002	AU 4821200 A	17-11-2000
			CA 2336670 A1	09-11-2000
			EP 1097464 A2	09-05-2001
			JP 2002543439 T	17-12-2002
			WO 0067290 A2	09-11-2000

Best Available Copy